Unit 15
Day 5

IN 2012, I DID NOT GET THROUGH THIS ENTIRE LESSON . . . MAY NEED TO ADDRESS THIS BY GIVING THE NOTES ONE DAY AND THEN DOING EXAMPLES THE NEXT.

Rational Root theorem:

If p/q is a rational number written in lowest terms, and if p/q is a zero of f, a polynomial function with integer coefficients, then p is a factor of the constant term and q is a factor of the leading coefficient.

Corollary of the rational root theorem:

If the leading coefficient of a polynomial function with integral coefficients is 1 , then any rational zeros of the function are integers and factors of the constant terms.

Factor completely and identify the zeros.

1) $f(x)=4x^3+16x^2+19x+6$

\# of possible zeros:

factors of p: $\pm 1, \pm 2, \pm 3, \pm 6$

factors of q: $\pm 1, \pm 2, \pm 4$

possible rational zeros: $\pm 1, \pm 2, \pm 3, \pm 6, \pm 1/2, \pm 1/4, \pm 3/2, \pm 3/4$

p/q

	4	16	19	6	
0				6	
1	4	20	39	45	UB
-1	4	12	7	-1	btw 0 + -1
$-\frac{1}{2}$	4	14	12	0	✓

$f(x)=(x+\frac{1}{2})(4x^2+14x+12)$

$f(x)=(2x+1)(2x^2+7x+6)$

$f(x)=(2x+1)(2x+3)(x+2)$

zeroes: $-1/2, -3/2, -2$

Boundedness Theorem:

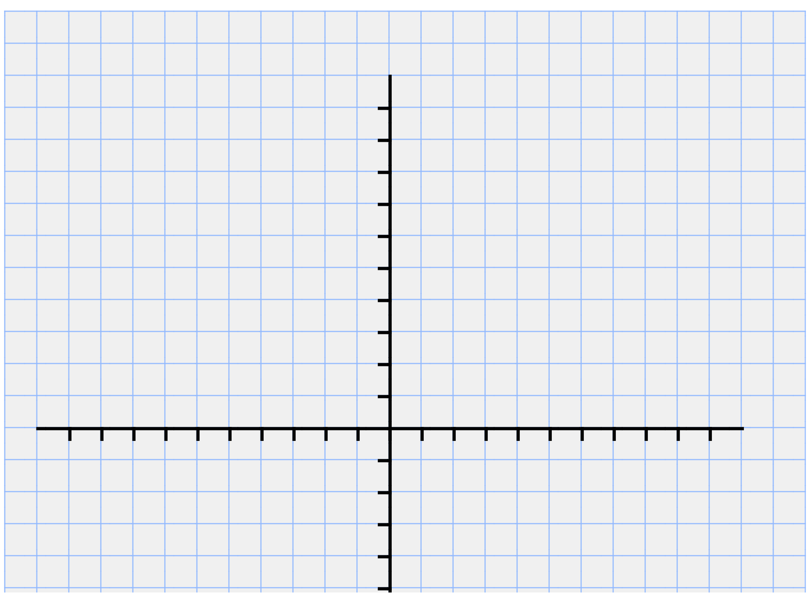
Let f(x) be a polynomial of degree $n \geq 1$ with real coefficients and with a positive leading coefficient. If f(x) is divided synthetically by :

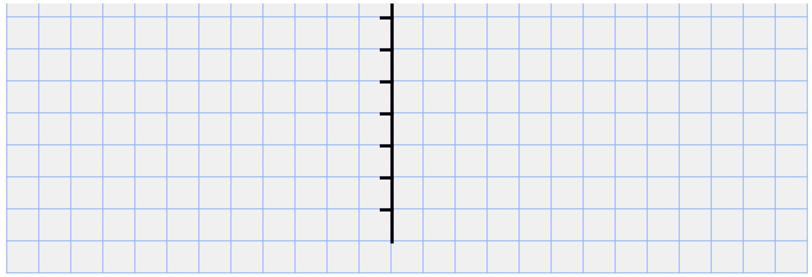
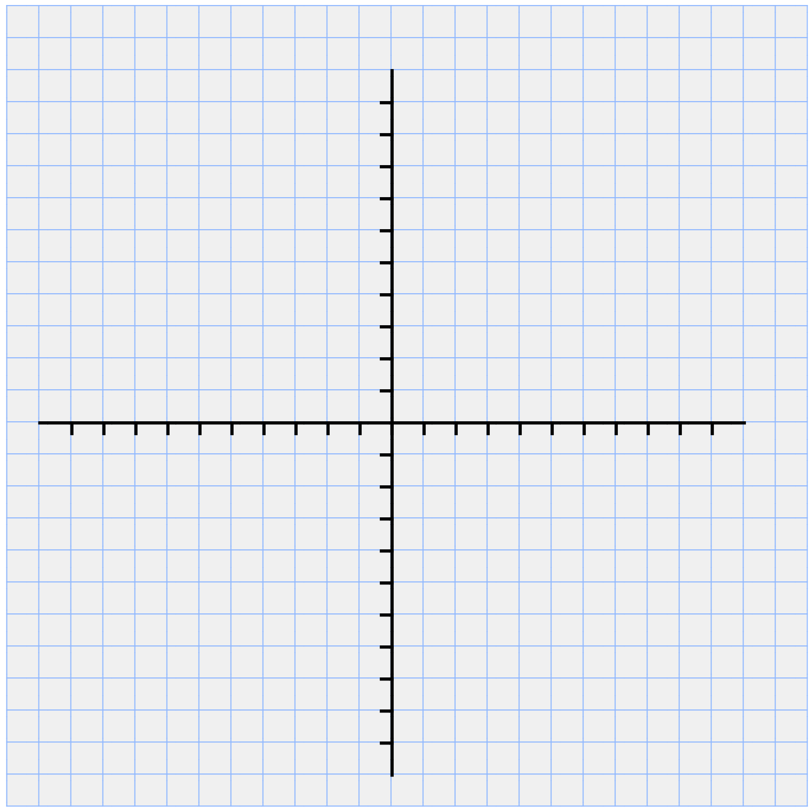
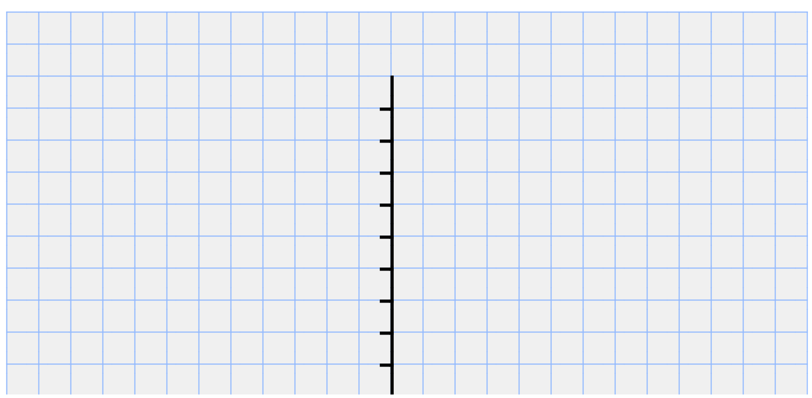
a) $k > 0$ and all numbers in the result are non-negative, then f(x) has no zero greater than k.

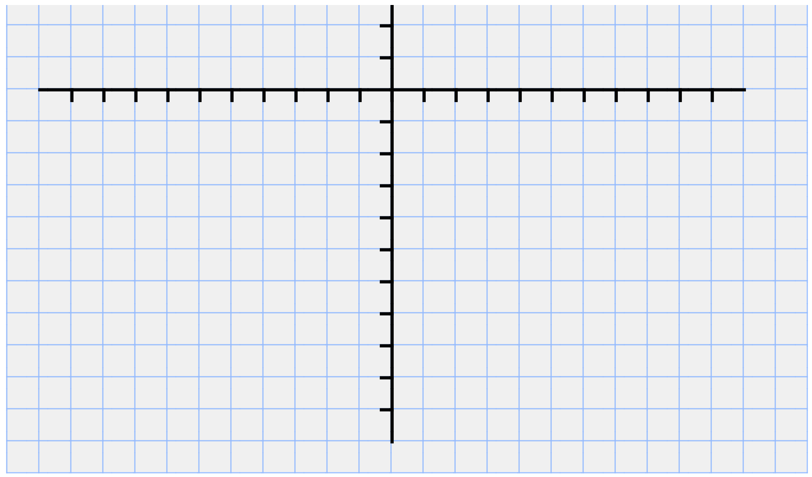
b) $k < 0$ and the numbers in the result alternate signs (0 pos. or neg as needed, then f(x) has no zero less than k.

Intermediate value theorem:

If f(x) is polynomial with only real coefficients , and if for real #'s a and b , the values of f(a) and f(b) are opposite in sign then there exists at least one zero between a and b.





2) $f(x)=2x^4+15x^3+28x^2-9x-36$

\# of possible zeros: 4

factors of p: $\pm1, \pm2, \pm3, \pm4, \pm6, \pm9, \pm18, \pm36, \pm12$

factors of q: $\pm1, \pm2$

possible rational zeros: $\pm1, \pm\frac{1}{2}, \pm2, \pm3, \pm\frac{3}{2}, \pm4, \pm6, \pm9, \pm\frac{9}{2}, \pm18, \pm36, \pm12$

	2	15	28	-9	-36	
0					-36	
1	2	17	45	36	0	✓ UB

$f(x)=(x-1)(2x^3+17x^2+45x+36)$

	2	17	45	36	
0				36	
1	2	19	64	100	
-1	2	15	30	6	> INT. VAL
-2	2	13	19	-2	
$-\frac{3}{2}$	2	14	24	0	✓

$f(x) = (x + 3/2)(x-1)(2x^2 + 14x + 24)$

$f(x) = (2x+3)(x-1)(x^2 + 7x + 12)$

$f(x) = (2x+3)(x-1)(x+4)(x+3)$

zeros $-3/2,\ 1,\ -4,\ -3$

HW pg 300 25-28 all & pg 312-313 33-38, 41-44 all